



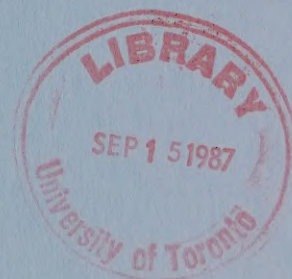
**NATIONAL ENERGY BOARD  
REASONS FOR DECISION**

In the Matter of the Application Under  
The National Energy Board Act

of

**The Manitoba Hydro-Electric Board**

**August 1987**



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**NATIONAL ENERGY BOARD**

IN THE MATTER OF the National Energy Board Act and the Regulations made thereunder; and

IN THE MATTER OF an application made by the Manitoba Hydro-Electric Board for an Export Licence under Part VI of the said Act, and filed with the Board under File No. 1923-4/M7-9.

HEARD in Winnipeg, Manitoba on 9 June 1987

**BEFORE**

A.D. Hunt	Presiding Member
J. Farmer	Member
A.B. Gilmour	Member

**APPEARANCES**

W. Burnett	Manitoba Hydro-Electric Board
R. Roth	
A. Derry	
K. Wellman	Saskatchewan Power Corporation
E. Finn	Ontario Hydro
A. Frame	Minister of Energy for Ontario
D. Tremblay	Board Counsel

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## Abbreviations Used in the Report

### *For Units of Measurement*

\$	dollars (expressed in Canadian funds unless otherwise stated)
GW.h	gigawatt hour (1 million kW.h)
km	kilometre
kV	kilovolt
kW.h	kilowatt hour
MW	megawatt
MW.h	megawatt hour
mill	one tenth of a cent (expressed in Canadian funds unless otherwise stated)

### *For Names*

"Agreement"	The Power Agreement between Manitoba Hydro-Electric Board and Northern States Power Company
"Board" or "NEB"	National Energy Board
"NEB Act" or "Act"	National Energy Board Act
"MEA"	Manitoba Energy Authority
"Manitoba Hydro" or "MH" or "Applicant"	Manitoba Hydro-Electric Board
"NSP"	Northern States Power Company
"OH"	Ontario Hydro
"SPC"	Saskatchewan Power Corporation

# Chapter 1

## Background

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The Applicant, Manitoba Hydro, is a Crown Corporation established in 1949 by the provincial legislature. It has broad powers to provide electric power throughout the province and operates under the *Manitoba Hydro Act*, being Chapter H 190 of the Continuing Consolidated Statutes of Manitoba, 1970.

The Manitoba Energy Authority is a Crown Corporation established in 1980 by the Manitoba Legislature under the *Manitoba Energy Authority Act*, being Chapter E 112 of the Continuing Consolidated Statutes of Manitoba. MEA is vested with the statutory duty to negotiate or direct negotiations for the purchase and sale of electric energy. MH requires the approval of MEA before it can export from or import power into Manitoba.

MH distributes electricity to consumers throughout the province with the exception of a portion of Winnipeg which is served by the city-owned Winnipeg Hydro. MH and Winnipeg Hydro operate as an integrated electrical generation and transmission system. MH is a liaison participant in the Mid-Continent Area Power Pool while Northern States Power Company is a full member. A map illustrating the major facilities of the integrated system as of 1986 is attached as Appendix 1.

The integrated system generation is composed of hydraulic generation with a winter capability of

4,091 MW, coal-fired generation with an operating capacity of 369 MW, and 278 MW of diesel and gas generation. Isolated diesel generation totals 23.2 MW. MH also has an agreement to purchase 300 MW of winter peaking capacity from NSP until 30 April 1993. Under adverse water conditions MH also has the right to purchase up to 1,500 GWh from NSP.

MH operates alternating current transmission lines at voltages of 138 kV, 230 kV and 500 kV, as well as a major north-south high voltage direct current (HVDC) tie at  $\pm 450$  kV linking the Nelson River stations to the load centres at Winnipeg. The Applicant has four 230 kV interconnections with Saskatchewan Power Corporation, also two 230 kV and one 115 kV interconnection with Ontario Hydro. MH also operates two 230 kV, one 500 kV and two lower voltage interconnections with utilities in the United States, viz. NSP, Minnkota Power Cooperative, Otter Tail Power Company, Minnesota Power and Light Company and the Roseau Electric Cooperative. These interconnections facilitate various inter-utility transactions including export sales by Manitoba Hydro.

MH presently holds eight export licences. The terms and conditions of these licences are summarized in Appendix 2.

## Chapter 2

# Application

By an application dated 20 January 1987, MH requested a firm export licence to sell to NSP a maximum of 200 MW of firm power with a maximum of 883 GW.h of energy in each of the six-month periods from 1 May to 31 October of the years 1993, 1994,

1995 and 1996. The sale would be in accordance with the power agreement for summer peaking capacity dated 25 February 1986 between NSP and MH and approved by MEA. The export would take place over existing international power lines.

## Chapter 3

# Agreement

---

Under an agreement between MH and NSP dated 25 February 1986, subject to the terms and conditions of the coordinating agreement between the parties dated 21 July 1976, MH would sell and NSP would purchase 200 MW of summer peaking capacity with a maximum of 883 GW.h of energy (100 percent capacity factor) for the period from 1 May to 31 October in each of the years 1993, 1994, 1995 and 1996. The power would be available to NSP on at least a 20 percent monthly capacity factor but MH could limit the delivery of energy above 20 percent monthly capacity factor.

The price for capacity delivered would be \$ U.S. 2,000 per MW per month, escalated from 1 May 1986 to 30 April 1993 and the price of energy would be the greater of 110 percent of MH incremental production costs or a price determined by a formula based on the decremental production costs of NSP, as described in more detail in section 4.7.1 of these Reasons.

## Chapter 4

# The Evidence

---

### 4.1 The Manitoba Load

In the fiscal year ending 31 March 1986, the Manitoba firm peak demand was 2,941 MW and the firm energy load was 15,366 GW.h. The annual report of MH for the fiscal year ending 31 March 1986 states that the Applicant served 346,719 customers comprised of 305,700 residential and farm customers and 41,019 power, general service and miscellaneous customers.

### 4.2 Load Forecast

The MH system load forecast dated May 1986 provided estimates of peak demand, annual energy requirements and growth rates over the proposed licence period. A summary of these estimates is attached as Table 1 (page 12).

MH stated that the annual peak demand on the Manitoba Hydro system occurs during the winter. The proposed export would take place during the summer months of May to October inclusive when the demand is lower. At present, maximum summer demand is about 1,000 MW less than the maximum winter demand.

MH stated that it has installed sufficient generation, primarily hydraulic, to supply annual peak loads, to provide a reasonable reserve margin and to meet its energy requirements under dependable river flow conditions. (Dependable river flow conditions were stated to be equal to the lowest of the 56 years of recorded river flow conditions in Manitoba). During the summer months, when system load is reduced, some of this generation is surplus to MH's needs and is available to generate energy for export. The amount of surplus energy in any year depends upon the actual river flow conditions.

### 4.3 Generation Capacity and System Additions

By the year 1993, when the proposed export would begin, MH stated that it would have an annual dependable energy capability of 24,329 GW.h and a capacity capability at the time of the system winter peak of 5,197 MW including stations owned by Win-

nipeg Hydro. The total generation capability would consist of 4,828 MW of hydraulic generation including the 1,280 MW Limestone station now under construction, scheduled for completion by stages in the period 1990-1992 and 369 MW of thermal generation.

In addition to in-province resources, MH has interconnections with utilities in Saskatchewan, Ontario and the United States that permit power transfers to enhance the economy and reliability of the system.

Construction of the Limestone generating station is being advanced to supply exports previously authorized by the Board by Licence EL-170. MH stated that no further additional generation or transmission facilities would be required to supply the exports covered by the present application.

### 4.4 Load, Supply and Surplus Power and Energy

A summary of MH's estimate of power capacity, domestic demand, and firm export demand and the resulting surplus power for the month of October in each year of the proposed export is attached as Table 2 (page 13). MH stated that October is forecast to be the month with the highest domestic demand within the period each year when the export would take place. A summary of MH's estimate of dependable energy capability, domestic load, firm export load and the resulting surplus energy for the summer months, during which exports would be made, for each year of the requested licence period is attached as Table 3 (page 14). MH submitted evidence that, under these conditions, sufficient surplus energy would be available in each month to meet at least the minimum quantity required by the export contract. MH also submitted evidence to show that, under average flow conditions, the hydraulic energy available would be about 25 percent greater than under dependable flow conditions. The additional energy under average flow conditions would amount to about 5,750 GW.h per year.

### 4.5 United States Market

MH stated that the proposed export would be made to NSP which is an investor-owned utility supplying

electricity and gas to customers in central Minnesota, Wisconsin, Minot, Grand Forks and the Fargo area of North Dakota, and the Sioux Falls area of South Dakota. NSP serves about 1.2 million customers with electricity. In 1986 NSP had a peak load of 6,012 MW. Energy sales of NSP in 1985 amounted to 29,600 GW.h. This energy was supplied approximately 35 percent from nuclear generation, 35 percent from coal-fired generation, 3 percent from their own hydro resources, less than 1 percent from oil-fired peaking units, about 15 percent from Manitoba Hydro and 11 percent from fossil fueled purchases. Total electric plant investment as of 31 December 1986 was \$5.1 billion and annual electric revenue was \$1.4 billion in U.S. funds.

MH and NSP have an agreement expiring in 1993 for a 300 MW summer/winter diversity exchange plus a 200 MW summer sale from MH to NSP. These sales are authorized by Licences EL-98 and EL-99. A 500 MW export sale authorized by Licence EL-170 commences in 1993 when the 300 MW diversity exchange and 200 MW export sale agreement expires. MH stated that MH and NSP could realize additional benefits from a 200 MW summer export sale as proposed in the present application, commencing after the expiry of sales under Licence EL-98.

## 4.6 Offers to Canadian Utilities

On 13 March 1986, MH sent similar letters of offer to SPC and OH, enclosing a copy of the agreement between NSP and MH dated 25 February 1986 and a table of estimated prices for capacity and energy for each year of the proposed export period.

By letter dated 15 April 1986, SPC replied that it was not interested in purchasing any portion of the proposed export under the terms and conditions specified in MH's letter.

By letter dated 23 April 1986, OH replied that, assessing the offer on the basis that any licence issued by the National Energy Board would include a condition similar to Condition 11 of Licence EL-98<sup>1</sup>, it found the offer not economic for Ontario Hydro.

MH objected to the inclusion of a condition in any licence the Board might issue requiring an offer at the time of export because such a condition could interfere with the scheduling of firm exports. MH stated that it was prepared to make an offer to Canadian utilities, before making an arrangement to export in excess of 20 percent monthly capacity factor, on terms and conditions including price not less favourable than those under which the export would be made. This offer would be made in advance of

commencing deliveries to NSP, on the basis of a tentative delivery schedule negotiated with the Canadian utilities.

At the hearing OH stated it was satisfied with this revised arrangement proposed by MH and OH expressed no further objection to the proposed export.

## 4.7 Prices and Costs

### 4.7.1 Export Price

The export price to be charged by MH pursuant to the summer peaking capacity agreement with NSP would be calculated using the following formulae:

#### *Capacity Pricing*

The price for capacity delivered would be \$2000 per megawatt per month in U.S. funds escalated from 1 May 1986 to 30 April 1993 using the Handy-Whitman Index of Public Utility Construction Costs for Fossil Steam Production Plants (identified as Total Steam Production Plant) in the North Central Region of the United States, assuming a uniform daily escalation rate between reporting dates of the Index.

#### *Energy Pricing*

The price for energy associated with the capacity would be the greater of \$16.5/MW.h in U.S. funds multiplied by the ratio A/B or 110 percent of MH's incremental costs where:

A = the \$ per MW.h steam production expenses for NSP for the 12-month period ending 30 April of that year, as taken from FERC Accounts 500 to 507 and 510 to 514.

B = the \$ per MW.h steam production expenses for NSP for the 12-month period ending 30 April 1988, as taken from the same FERC accounts.

MH stated that the base price of \$16.5/MW.h is representative of the NSP expected incremental cost of energy from other sources in 1988. The ratio A/B is designed to escalate the base price from 1988 to the year of the export sales, using NSP's actual generation costs.

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1 Condition 11 of Licence EL-98 requires, *inter alia*, that the Licensee, before exporting energy in excess of 20 percent monthly capacity factor on the amount of peaking capacity committed for export, offer such energy for sale to all economically accessible Canadian utilities at the same price as that of the export, adjusted for any differences in the cost of delivery.

## Estimated Prices

The average annual combined price for capacity and energy was estimated by MH to range from 52.2 mills per kW.h in 1993 to 56.5 mills/kW.h in 1996, in current Canadian dollars. These estimates are based on annual export deliveries of 177 GW.h, the energy equivalent to 200 MW exported at 20 percent monthly capacity factor for six months of each year, which is the minimum delivery required by the contract. Unit prices would be lower for exports in excess of the minimum agreed quantities while the total revenue would be greater.

MH testified at the hearing that, if the proposed export were taking place at the present time, the combined unit price, assuming the minimum export required under the contract, would be approximately 40 mills per kW.h. By comparison, the MH total system energy costs are approximately 35 mills per kW.h and the large power customer rate in Manitoba is about 30 mills per kW.h.

### 4.7.2 Applicable Costs in Canada

MH stated that the proposed export would be generated and transmitted using existing facilities. Therefore, there would be no capital costs nor any significant increase in operating or maintenance costs due to the export.

### 4.7.3 Price of Equivalent Service to Canadians

The responses of OH and SPC to offers by MH of the power and energy proposed for export showed that they were not, at this time, interested in the proposed export. However, OH and SPC both expressed an interest in having an opportunity to reconsider this decision in future in respect of exports in excess of minimum contractual requirements. MH stated that it was willing to make a first offer to economi-

cally accessible Canadian electricity utilities on the same terms and conditions as those of the proposed export.

### 4.7.4 Alternative Cost in United States

MH stated that NSP's most likely alternative to purchasing the proposed export would be a purchase from another Mid-Continent Area Power Pool member.

Schedule H of the MAPP agreement provides for purchases of firm power under terms and conditions that MH stated are similar to those applicable to the proposed export. Prices in U.S. dollars are shown below.

## 4.8 Economic Analysis

In the application, MH submitted a cost recovery analysis of the proposed export to show that the proposed export could be supplied from existing surplus power and energy and that it required no change of planned in-service dates for any facilities. The analysis also examined the difference in the revenue stream with and without the proposed export sale. Estimates of the revenue, cost and profit associated with the proposed export sale are summarized in Table 4. (page 15) For the purposes of the cost recovery analysis, MH took the revenues that could be realized by the alternative sale of the energy on an interruptible basis as representing the costs of the proposed sale to NSP. MH estimated that it would be able to sell energy in the United States markets at about 16.5 mills/KW.h U.S. in 1988. In the submission of MH, the analysis showed that the estimated revenue of \$15.8-18.5 million from the minimum export required under the agreement with NSP would be approximately twice the revenue that could be realized by the alternative sale of the energy on an interruptible basis.

	MAPP Agreement	Export Agreement with NSP
Capacity charge	\$2,000/MW/month (currently)	\$2,000/MW/month (escalated from 1986 to 1993)
Energy charge	The greater of 6 mills/kW.h (currently) or 110% of incremental cost	The greater of 16.5 mills/kW.h (escalated from 1988 to year of delivery) or 110% of incremental cost

#### **4.9 Environmental Impact and Provincial Review Process**

MH stated that it would generate the power and energy for export from hydraulic generation that is surplus in the summer months. Consequently, there would be no change in river regimes or unusual changes in flows. Also, exports would be made over existing international power lines. Consequently,

there would be no significant environmental impact associated with the export.

MH requires, and has obtained, the approval of the Manitoba Energy Authority to make the proposed export. MH has also been granted Order in Council No. 537 from the Manitoba Lieutenant Governor in Council approving the agreement between MH and NSP.

## Chapter 5

# Interventions

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Three parties intervened at the hearing, Ontario Hydro, Saskatchewan Power Corporation, and the Minister of Energy for Ontario. Summaries of the interventions are given below.

### 5.1 Ontario Hydro

In its intervention, Ontario Hydro expressed concern about section 1.2.2 of the application wherein it was stated that the requested licence should not contain a condition similar to Condition 11 of Licence EL-98. OH submitted that such a condition is necessary in the Canadian interest.

Furthermore, Ontario Hydro questioned whether the proposed export sale would be firm only to the extent of 20 percent monthly capacity factor and any energy in excess of 20 percent would be non-firm requiring further offers to neighbouring Canadian utilities at the time of delivery.

In its submission at the public hearing, Ontario Hydro stated that it was satisfied with the revised arrangements proposed by MH whereby MH, before making an arrangement to export energy in excess of

20 percent monthly capacity factor, would offer such energy to accessible Canadian electrical utilities on similar terms and conditions to those of the export and on the basis of a tentative delivery schedule negotiated between MH and the Canadian utility.

Ontario Hydro expressed no further objections to the issuance of a licence as applied for by Manitoba Hydro.

### 5.2 Saskatchewan Power Corporation

Saskatchewan Power stated that it agreed in principle with the method proposed by Manitoba Hydro and supported by OH whereby energy proposed for export would be offered to SPC in advance of MH making an arrangement to export. On the basis that any licence the Board might issue would contain a condition requiring the proposed offering procedure, SPC supported the application of MH.

### 5.3 Minister of Energy for Ontario

The Minister of Energy for Ontario took no position on the application.

## Chapter 6

# Disposition

Section 83 of the Act requires the Board, in examining an application for an export licence, to have regard to all considerations that appear to it to be relevant. Without limiting the generality of the foregoing, the Board is required to satisfy itself that the power to be exported is surplus to reasonably foreseeable Canadian requirements and that the price to be charged is just and reasonable in relation to the public interest.

### 6.1 Surplus

The surplus estimates shown in Tables 2 and 3 result from MH's May 1986 load forecast. MH stated that the proposed export is possible because the Manitoba demand in the summer months of May to October is significantly less than demand in the winter months. Consequently, there is no need to construct additional facilities, nor to advance the in-service date of presently planned facilities, in order to supply the proposed export. The Board is satisfied that the methodology used in preparing the load forecasts is reasonable and accepts that MH will have surplus power and energy during the summer months of 1993 to 1996.

Based on its examination of the surplus figures shown in Tables 2 and 3, the Board is satisfied that, after meeting its in-province requirements and existing firm out-of-province commitments, MH will have sufficient surplus power and energy to make at least the minimum proposed export at all times.

The evidence shows that the amount of hydro energy would be about 25 percent greater under average flow conditions than under dependable flow conditions. Consequently, the Board is satisfied that MH is likely to have available for export a quantity of energy sufficient to satisfy the upper limit of the export agreement. In the event of insufficient precipitation, MH has the right, under its agreement with NSP, to reduce energy exports to the minimum level equivalent to 20 percent capacity factor.

The Board notes that, following negotiations between the parties, OH and SPC were not opposed to the proposed export provided that they had an opportunity to purchase that part of the proposed export

in excess of 20 percent monthly capacity factor. Neither OH nor SPC expressed any interest in purchasing the power and energy associated with the first 20 percent monthly capacity factor of the 200 MW export. Both parties sought the opportunity to purchase the balance of any proposed exports on terms and conditions, including price, not less favourable than those under which the export would be made.

MH proposed that when it had an exportable surplus over 20 percent monthly capacity factor, it would ascertain if NSP was interested in purchasing the energy. If so, that block, with similar terms and conditions of quantity, duration, dispatch, price etc., would be offered to OH and SPC. If OH or SPC accepted the offer, or if NSP accepted the offer following Canadian refusals, the agreed block of energy would become a firm sale. OH and SPC stated that they would be satisfied with such arrangements.

The Board is satisfied that the proposed procedure for offering surplus electricity in excess of 20 percent monthly capacity factor to economically accessible Canadian electrical utilities would provide sufficient flexibility for Manitoba Hydro to maximize its export opportunities without being prejudicial to the interests of other Canadian utilities. These arrangements would also provide additional assurance that any export in excess of 20 percent monthly capacity factor would be surplus to Canadian needs.

### 6.2 Export Price

In assessing the suitability of an export price, the Board has developed three guidelines: the export price should recover the applicable costs incurred in Canada, it should not be less than the price for equivalent service to Canadian customers, and it should not be materially less than the least cost alternative in the proposed market area.

#### 6.2.1 Applicable Costs in Canada

When assessing whether the export price associated with a proposed export meets the first price guideline, it is normal for the Board to compare the export price and associated revenue to the costs which are directly associated with, or are the direct results

of, the particular proposed export. The Applicant provided evidence that the proposed export would be generated and transmitted using existing facilities. Therefore, there would be no capital costs nor any appreciable increase in operating and maintenance costs attributable to the export. Revenues derived from export sales would provide a significant contribution to sunk system costs.

The Board accepts the estimates of MH that revenues from the export would amount to about \$17.1 million compared to revenues of about \$8.5 million that would be realized from the sale of a similar quantity of energy on an interruptible basis. Thus, there would be a net benefit to MH with a present value of about \$8.6 million in 1986 dollars compared with alternative sales.

Additional information was provided by Manitoba Hydro that the per-unit revenue that would be received from this export power would exceed the per-unit costs of power in the total Manitoba Hydro system, insofar as these two quite different classes of power can be compared. While recognizing that it is not necessary in this case that export revenues should exceed system costs, the Board finds additional comfort in noting that the proposed export would be beneficial even when measured against the test of full system costs.

Based on the above considerations the Board finds that the export revenues would exceed the associated costs and is satisfied that the export price would recover an appropriate share of the costs incurred in Canada.

### ***6.2.2 Price for Equivalent Service to Canadians***

In order to make a determination regarding the second price guideline, information is generally required on prices obtained by MH for sales to interconnected Canadian utilities which are equivalent to the type of export sale being contemplated. In this instance, there are no agreements in place between MH and either OH or SPC covering the sale by MH of firm power and energy on a basis comparable to the proposed export.

The Board notes that OH and SPC refused offers of the first 20 percent monthly capacity factor and negotiated a mutually satisfactory arrangement with MH for the offer of the balance of the proposed export. Consequently, the Board is satisfied that Canadian utilities have been afforded the opportunity to purchase the proposed export on terms and conditions including price, not less favourable than those offered to NSP.

The Board is satisfied that, under these conditions, the export price would not be less than the price for equivalent service to Canadian customers.

### ***6.2.3 Purchaser's Least Cost Alternative***

The Board notes that NSP's most probable least cost alternative source of supply would be to make a purchase from another utility at rates specified in the Mid-Continent Area Power Pool agreement.

The Board accepts the evidence of MH that it expects to be able to export interruptible energy at about 16.5 mills/KW.h U.S. by 1988 i.e. that 16.5 mills/KW.h is a reasonable estimate of market prices in the region in 1988. There is reasonable provision for escalation of energy rates. The capacity charge of \$2,000/MW/month in 1986 has been in effect for several years and it seems reasonable. There is reasonable provision for escalation of the capacity charge up to the proposed commencement of exports in 1993.

The Board is satisfied that the export price would not be materially less than the least cost alternative price and that the export price is the best price that could be negotiated by the Applicant in the United States market.

The Board is satisfied that the export price is just and reasonable in relation to the public interest.

## **6.3 Environmental Impact**

The Applicant intends to supply the export from its existing system hydraulic generation. There will be no changes to facilities or operations.

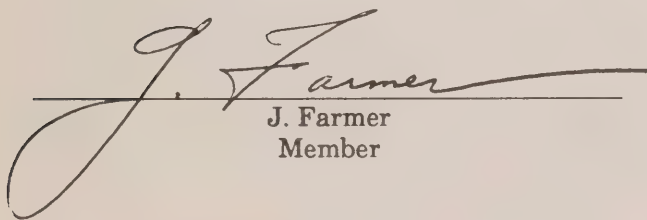
The Board is therefore satisfied that no material adverse environmental impact would result from the production of power or energy which the Applicant seeks to export

#### 6.4 The Board's Finding

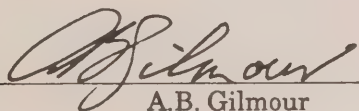
The Board, having satisfied itself that the power and energy to be exported are surplus to reasonably foreseeable Canadian requirements, and that the prices to be charged are just and reasonable in relation to the public interest, and having had regard to all other considerations that appear to it to be relevant, is prepared to issue to Manitoba Hydro a licence authorizing the export to NSP of up to 200 MW of firm power and up to 883 GW.h of firm energy during the period from 1 May to 31 October in each of the years 1993, 1994, 1995 and 1996. Applicable terms and conditions are set out in Appendix 3.



A.D. Hunt  
Presiding Member



J. Farmer  
Member



A.B. Gilmour  
Member

Ottawa, Canada  
August, 1987

**Table 1****Manitoba Hydro  
Peak Demand, Annual Energy Requirement And Growth Rates<sup>1</sup>**

	<b>1993/94</b>	<b>1994/95</b>	<b>1995/96</b>	<b>1996/97</b>
Peak demand (MW)	3,978	4,068	4,157	4,234
Average annual growth rate from 1993/94 (%)	—	2.3	2.2	1.9
Annual energy requirement (GW.h)	19,965	20,418	20,868	21,293
Average annual growth rate from 1993/94 (%)	—	2.3	2.2	2.0

---

<sup>1</sup> Taken from Manitoba Hydro May 1986 System Load Forecast

**Table 2**

**Manitoba Hydro  
Capacity, Demand and Surplus Power  
For Month of October<sup>1</sup> in Each Year in Licence Period  
(MW)**

	<b>1993/94</b>	<b>1994/95</b>	<b>1995/96</b>	<b>1996/97</b>
<b>Capacity</b>				
Hydro	4,828	4,828	4,828	4,828
Thermal	369	369	369	369
<b>Total</b>	<b>5,197</b>	<b>5,197</b>	<b>5,197</b>	<b>5,197</b>
<b>Demand</b>				
Manitoba Demand	2,802	2,865	2,928	2,985
Existing NSP	500	500	500	500
Export Losses <sup>2</sup>	50	50	50	50
Reserve <sup>3</sup>	336	344	351	358
<b>Total</b>	<b>3,688</b>	<b>3,759</b>	<b>3,829</b>	<b>3,893</b>
Excess	1,509	1,438	1,368	1,304
Proposed Export NSP	200	200	200	200
<b>Surplus Remaining</b>	<b>1,309</b>	<b>1,238</b>	<b>1,168</b>	<b>1,104</b>

<sup>1</sup> October is the month with the highest in-province demand in the part of the year in which the export would take place

<sup>2</sup> Losses on existing export to NSP

<sup>3</sup> Reserve of 12% for Manitoba demand only

**Table 3**

**Manitoba Hydro**  
**Total Dependable Energy Capability, Load and Surplus Energy**  
**For Summer Months of Export**  
 (GW.h)

	1993/94	1994/95	1995/96	1996/97
<b>Capacity</b>				
Hydro	9,325	9,325	9,325	9,325
Thermal	<u>930</u>	<u>930</u>	<u>930</u>	<u>930</u>
Total In-Province	10,255	10,255	10,255	10,255
Firm Imports	750	750	750	750
Total	<b>11,005</b>	<b>11,005</b>	<b>11,005</b>	<b>11,005</b>
<b>Demand</b>				
Firm Energy Demand Manitoba	8,107	8,288	8,467	8,632
Existing NSP <sup>1</sup>	1,822	1,822	1,822	1,822
Total	<b>9,929</b>	<b>10,110</b>	<b>10,289</b>	<b>10,454</b>
Excess	1,076	895	716	551
New NSP <sup>2</sup>	195	195	195	195
Surplus	881	700	521	356

1 Energy is provided by NSP under low flow conditions in Manitoba. Demand figure is for the firm sale obligation of 500 MW at 75% capacity factor plus 10% for losses under Licence EL-170.

2 Minimum export (200 MW @ 20% monthly capacity factor) plus 10% losses + 12% reserve.

**Table 4**

**Manitoba Hydro  
Estimated Revenue, Cost and Profit of Proposed Export Sale  
From Manitoba Hydro Cost Recovery Analysis**

<b>Factors</b>	<b>Revenue<sup>1</sup> \$ Million<sup>3</sup></b>	<b>Cost<sup>2</sup> \$ Million<sup>3</sup></b>	<b>Estimated Profit \$ Million<sup>3</sup></b>	<b>Revenue/Cost Ratio (:1)</b>
As forecast <sup>4</sup>	17.1	8.5	8.6	2.0
<b>Sensitivity analyses</b>				
Capacity Price Escalation = 3%	16.1	8.5	7.6	1.9
Capacity Price Escalation = 7%	18.2	8.5	9.7	2.1
Energy Price Escalation = 3%	16.1	7.1	9.0	2.3
Energy Price Escalation = 7%	18.3	10.2	8.1	1.8
U.S. Dollar = 1.4 CDN	18.5	9.2	9.3	2.0
U.S. Dollar = 1.2 CDN	15.8	7.9	7.9	2.0

1. Estimated gross revenue from minimum export

2. Estimated gross revenue from alternative sale of energy on interruptible basis

3. Present Value in millions of 1986 Canadian dollars

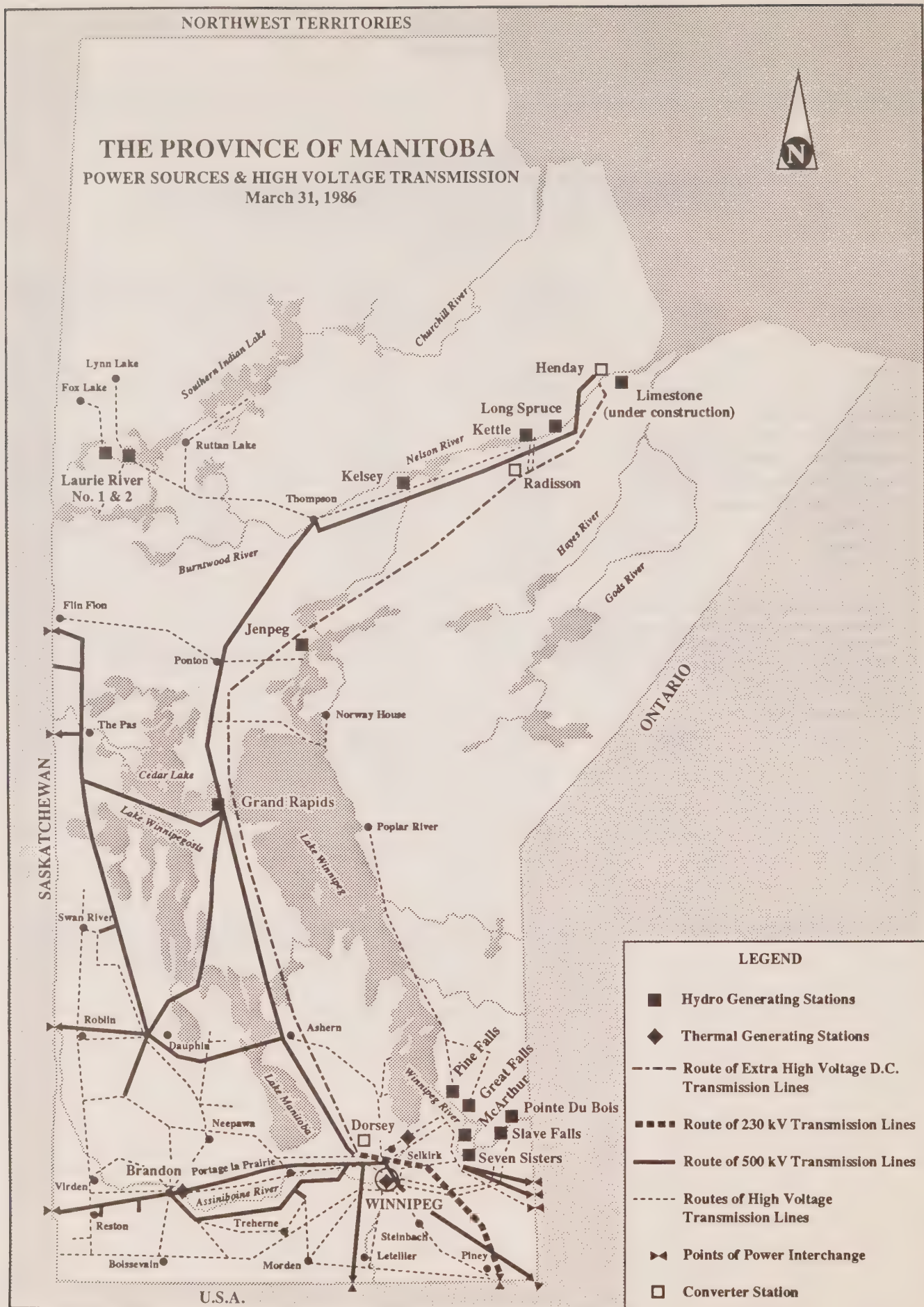
4. Forecast factors - Capacity price escalation - 5%

- Energy price escalation - 5%

- U.S. dollars = 1.3 Cdn dollar

- Discount rate = 10%

# Appendix 1



## Appendix 2

### Licences Held by Manitoba Hydro

Licence No.	Description	Commencement Date	Termination Date
EL-97	<ul style="list-style-type: none"> <li>- Interruptible Energy</li> <li>- 19,500 GW.h for entire licence term</li> </ul>	1 May 1980	31 October 1992
EL-98	<ul style="list-style-type: none"> <li>- Firm Power (summer peaking capacity)</li> <li>- 200 MW/876 GW.h per calendar year</li> <li>- export period 1 May - 31 October</li> </ul>	1 May 1980	31 October 1992
EL-99	<ul style="list-style-type: none"> <li>- Firm Equichanges (seasonal diversity)</li> <li>- 300 MW/262.8 GW.h per calendar year</li> <li>- export period 1 May - 31 October</li> </ul>	1 May 1980	30 April 1993
EL-100	<ul style="list-style-type: none"> <li>- Carrier Transfers and Unscheduled Loop Flows</li> <li>- 800 GW.h per consecutive 12-month period</li> </ul>	1 May 1980	31 October 1992
EL-101	<ul style="list-style-type: none"> <li>- Firm Energy Storage Transfers</li> <li>- 2,500 GW.h per consecutive 12-month period</li> <li>- exports must equal imports less losses and spillage</li> </ul>	1 May 1980	31 October 1992

<b>Licence No.</b>	<b>Description</b>	<b>Commencement Date</b>	<b>Termination Date</b>
EL-102	<ul style="list-style-type: none"> <li>- Short Term Firm Sale and Equichange Transfers (assured delivery)</li> <li>- lesser of 800 MW or surplus system capacity</li> <li>- per operating year the lesser of 5000 GW.h or 65% of energy surplus plus energy imported as return of energy exported</li> </ul>	1 May 1980	31 October 1992
EL-103	<ul style="list-style-type: none"> <li>- Interruptible Energy</li> <li>- 12,000 GW.h per consecutive 12-month period less exports under EL-97, EL-98, EL-99, EL-100, EL-101 and EL-102</li> </ul>	1 May 1980	31 October 1992
El-170	<ul style="list-style-type: none"> <li>- Firm Power and Energy</li> <li>- 500 MW/3405 GW.h per consecutive 12-month period</li> </ul>	1 May 1993	30 April 2005

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### **Terms and Conditions of Export Licence Firm Power and/or Energy (proposed Licence EI-174)**

1. The term of this licence shall commence on 1 May 1993 and shall end on 31 October 1996.
2. The Licensee shall export power and energy only during the period commencing 1 May and ending on 31 October in each year throughout the term of this licence.
3. The class of inter-utility export authorized is the sale transfer of firm power and energy.
4. The power and energy to be exported may be transmitted over any international power line for which a Board Certificate of Public Convenience and Necessity is in effect.
5. The power and energy to be exported shall be the firm power and energy described in article 1.1 of the agreement between the Northern States Power Company and The Manitoba Hydro-Electric Board dated 25 February 1986.
6. Any amendment to, addition to, termination of, or substitution for the agreement referred to in Condition 5 shall not be effective until approved by the Board.
7. The quantity of power that may be exported shall not exceed 200 megawatts.
8. The quantity of energy that may be exported during each six-month period of May through October, within the term of this licence, shall not exceed 883 gigawatt hours.
9. The price to be charged for exports of power and energy shall not be less than the price as set out in articles 1.2 and 1.3 of the agreement referred to in Condition 5 or such other price as the Board may approve.
10. The Licensee shall interrupt or reduce the delivery of power and energy whenever and to whatever extent such power and energy are required to supply firm loads within the system of Manitoba Hydro.
11. The Licensee, before making an arrangement to export energy in excess of 20 percent monthly capacity factor:
  - (a) shall offer such energy for sale to all economically accessible Canadian electrical utilities on terms and conditions including price not less favourable than those under which the export would be made. The price should be adjusted for any differences in the cost on the Licensee's system of delivering the power and energy to the Canadian electrical utility instead of the export customer; and
  - (b) shall make the offer in accordance with subcondition (a), in advance of commencing deliveries to Northern States Power Company, on the basis of a tentative delivery schedule negotiated with the Canadian electrical utilities.
12. The Licensee shall, within 15 days after the end of each month comprised in the term of this licence, file with the Board a report, in such form and detail as the Board may specify, setting forth information for that month pertaining to transactions under this licence.









